Citation:

Wannamethee SG, Field AE, Colditz GA, Rimm EB. Alcohol intake and 8-year weight gain in women: a prospective study. *Obes Res.* 2004 Sep;12(9):1386-96.

PubMed ID: 15483203

Study Design:

Prospective cohort study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine prospectively the relationship between alcohol and 8-year weight gain in women.

Inclusion Criteria:

- Participants in the Nurses' Health Study II (1989, 116,671 female registered nurses 25 to 42 years old living in one of 14 U.S. states responded to a baseline questionnaire about their medical history and lifestyle)
- Completed a 116-item food frequency questionnaire in 1991
- Self-reported weights on both a 1991 and 1999 study questionnaires

Exclusion Criteria:

- Women with a history of cardiovascular disease, diabetes, or cancer and
- Women who were pregnant 2 years before 1991 or who became pregnant between 1991 and 1999

Description of Study Protocol:

Recruitment

Nurses' Health Study II is an ongoing study designed to examine the association between lifestyle and nutritional factors and the occurrence of breast cancer and other major illnesses.

Design: Prospective cohort study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Tests of linear trend were conducted across increasing categories of alcohol consumption by assigning the median for the alcohol categories and treating the categories as a continuous variable
- Logistic regression was used to assess the relative odds (odds ratio) of >=5-kg weight gain

Data Collection Summary:

Timing of Measurements

Follow-up questionnaires of Nurses's Health Study II were mailed every 2 years, in 1991, 1993, 1995, 1997, and 1999. The present paper is concerned with weight change from 1991 to 1999.

Dependent Variables

- Weight change: difference (in kilograms) between weights self-reported in 1991 and 1999 follow-up questionnaries
- BMI change
- Odds of gaining at least 5 kg: in some analyses

Independent Variables

- Alcohol intake (g/d) : 5 alcohol intake categories (none, 0.1 to 4.9, 5.0 to 14.9, 15.0 to 29.9, and >=30 g/d)

Control Variables

- Age
- Smoking status
- Physical activity (quintiles of METS)
- Menopausal status in 1991 (yes/no)
- African American (yes/no)
- Spousal education (1999)
- Dietary factors (total nonalcohol calorie intake, protein, trans fat, saturated fat, sucrose, and fiber)
- Changes in smoking status (never, ex since 1991, gave up in 1993, in 1995, in 1997, in 1999, and current smokers in 1999)
- Initial weight (1991)
- Height (1989)
- Spousal education (1999)
- Previous weight change in 1989 to 1991

Description of Actual Data Sample:

Initial N: 94,373 female nurses

Attrition (final N): 49,324

Age: mean approximately 38 years

Ethnicity: mostly White

Other relevant demographics:

Anthropometrics:

- The average weight in 1991 (baseline) was 67.1 kg (SD 15.1 kg), and the average BMI at baseline was 24.64 (5.25) kg/m^2. Noted that alcohol drinkers had lower baseline BMI than nondrinkers.
- Mean weight change between 1991 and 1999 was 5.8 kg (SD 7.8)

Location: United States

Summary of Results:

Alcohol intake (g/d) and adjusted mean BMI (SE) at 1991 and mean weight change 1991 to 1999 among 49,324 young and middle-aged women enrolled in the Nurses' Health Study II

Alcohol intake (g/d)	Never drinkers	Ex-drinkers	0.1 to 4.9 g	5.0 to 14.9 g	15 to 29.9 g	≥30 g	Linear trend	Quadratic trend
N	6739	14,118	19,144	7304	1431	588		
Mean BMI (kg/m^2), adjusted*	25.04 (0.06)	25.31 (0.04)	24.40 (0.04)	23.69 (0.06)	24.00 (0.14)	24.77 (0.21)	<0.0001	<0.0001
Mean weight change (kg), Adjusted‡	5.90 (0.09)	5.92 (0.06)	5.73 (0.05)	5.60 (0.09)	5.35 (0.20)	5.83 (0.32)	0.02	<0.0001

*adjusted for age, smoking status,physical activity (quintiles of METS), menopausal status in 1991 (yes/no). African American (yes/no), spousal education (1999), dietary factors (total nonalcohol calorie intake, protein, trans fat, saturated fat, sucrose, and fiber).
‡adjusted for all control variables

Alcohol and adjusted relative odds of ≥5-kg weight gain over 8 years among 49,324 young and middle-aged women enrolled in the Nurses Health Study II

Alcohol intake (g/d)	*N*	% Gain ≥5 kg	Adjusted‡ odds gain ≥5 kg
None	20857	49.5	1.00
0.1 to 4.9 g	19144	46.7	0.94 (0.89,0.99)
5.0 to 14.9 g	7304	43.9	0.92 (0.85,0.99)
15 to 29.9 g	1431	41.4	0.86 (0.76,0.98)
30+ g	588	45.8	1.07 (0.89,1.28)
Test for linear trend	*P*=0.54		

Test for quadratic trend	*P*=0.007

‡adjusted for all control variables

Type of drink and weight gain:
The adjusted relative odds ratio (OR) for those consuming 0, 0.1 to 14.9, 15.0 to 29.9, and 30+ g/d were 1.00, 0.91 (0.87, 0.95), 0.91 (0.84, 0.99), and 1.22 (0.89,1.65) for beer drinking (test for trend p=0.0008); 1.00,0.96 (0.92, 1.00), 0.92 (0.84, 0.99), and 1.14 (0.66, 1.95) for wine drinking (test for trend p=0.01); and 1.00, 1.05 (1.00, 1.11), 1.10 (1.00, 1.22), and 0.88 (0.62, 1.24) for liquor drinking (test for trend p=0.02). Among drinkers, wine drinkers showed similar odds of weight gain to beer drinkers (OR =1.00), but liquor drinkers showed higher odds than beer drinkers even after adjustment for amount drunk [OR= 1.07; 95% confidence interval (CI) 1.02 to 1.13].

Author Conclusion:

Our data suggest that light to moderate drinking (up to 30 g/d) is not associated with weight gain in women except possibly in African-American women. Heavier drinking may promote weight gain in women.

A U-shaped relationship was seen between alcohol and weight gain (>=5 kg) after adjustment for a wide range of
confounders, with the highest odds in heavy drinkers.

Reviewer Comments:

The major limitation of this study relates to the outcome measurements. All weight outcomes were relying on self-reported data only. Because the exposure (alcohol consumption) was also self-reported data, it is likely to have dependent bias meaning that the reporting of exposure and outcome may depend on each other.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes

4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	N/A
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No

7.1.	Were primary and secondary endpoints described and relevant to the question?	No
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	No
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes